

REMARKS/ARGUMENTS

Claims 1-24 are pending in the present application.

This Amendment is in response to the Final Office Action mailed March 8, 2007 to support a Request for Continued Examination (RCE) filed concurrently. In the Final Office Action, the Examiner rejected claims 1-3, 7-11, 15-19, and 23-24 under 35 U.S.C. §102(b); and claims 4, 5, 6, 12, 13, 14, 20, 21- 22, and 25-27 under 35 U.S.C. §103(a). Reconsideration in light of the remarks made herein is respectfully requested.

Responses to the Examiner's arguments

In the Final Office Action, the Examiner responded to Applicant's arguments in the previously filed response. However, the Examiner's response is either incomplete or incorrect as discussed below.

A) The Examiner contends that Honda in col. 5, lines 40-67, and in col. 6, lines 52-55, discloses highly absorbing salts (material) of antimony added in the claims percentage (about 5% to 30%) along with the baseline material to form the resist material composition. (Final Office Action, page 6, paragraph 8.A). Applicant respectfully disagrees and submits that Honda does not disclose antimony.

For ease of reference, the cited excerpts are copied below.

"The photoacid generating compound is preferably selected from a family of the compounds which generate small acidic molecules having pKa less than 4. PAG's useful for the above purpose may be selected from various onium salts, halogen-containing compounds, and sulfonates including the following:

[I] Onium salts: Triphenylsulfonium tetrafluoroborate, Triphenylsulfonium hexafluoroantimonate, Triphenylsulfonium hexafluoroarsenate, Triphenylsulfonium hexafluorophosphate, Triphenylsulfonium trifluorosulfonate, 4-Thiophenoxydiphenylsulfonium tetrafluoroborate, 4-Thiophenoxydiphenylsulfonium hexafluoroantimonate, 4-Thiophenoxydiphenylsulfonium hexafluoroarsenate, 4-Thiophenoxydiphenylsulfonium hexafluorophosphate, 4-Thiophenoxydiphenylsulfonium trifluorosulfonate, 4-tert-Butylphenyldiphenylsulfonium tetrafluoroborate, 4-tert-Butylphenyldiphenylsulfonium hexafluoroantimonate, 4-tert-Butylphenyldiphenylsulfonium hexafluoroarsenate, 4-tert-Butylphenyldiphenylsulfonium hexafluorophosphate, 4-tert-Butylphenyldiphenylsulfonium trifluorosulfonate, Tris(4-

methoxyphenyl)sulfonium tetrafluoroborate, Tris(4-methoxyphenyl)sulfonium hexafluoroantimonate, Tris(4-methoxyphenyl)sulfonium hexafluoroarsenate, Tris(4-methoxyphenyl)sulfonium hexafluorophosphate, Tris(4-methoxyphenyl)sulfonium trifluorosulfonate, Tris(4-methoxyphenyl)sulfonium tetrafluoroborate, Tris(4-methoxyphenyl)sulfonium hexafluoroantimonate, Tris(4-methoxyphenyl)sulfonium hexafluoroarsenate, Tris(4-methoxyphenyl)sulfonium hexafluorophosphate, Tris(4-“ (Honda, col. 5, lines 38-67; col. 6, lines 1-12)

Preferably, the alkaline dissolution inhibitor is from about 5% to 30% by weight of the solids of said radiation-sensitive composition. And preferably, the photoacid generating compound is from about 5% to 30% by weight of the solids of said radiation sensitive composition. (Honda, col. 6, lines 51-55).

As seen from the above excerpts, none of the cited materials is antimony as alleged by the Examiner. Applicant respectfully requests the Examiner to cite the specific column and line numbers where antimony is disclosed.

B) The Examiner contends that Honda is not relied upon to disclose thinning the resist to about 100nm (Final Office Action, page 6, paragraph 8.B). The Examiner further contends that Honda teaches different spinning techniques in order to obtain a resist film of desired thickness (Final Office Action, page 7, lines 1-2). Applicant respectfully disagrees.

In the response filed December 8, 2006, Applicant did not argue that Honda does not disclose thinning the resist to about 100 nm. Rather, Applicant argued that Honda does not disclose thinning the resist. The limitation “to a thickness below 100 nm” is added in Claim 5, which is argued separately under the 35 U.S.C. §103(a) rejections.

Applicant submits that spinning is not the same as thinning. Honda specifically discloses that method such as dipping, spraying, whirling, and spin coating are used to apply the resist to a substrate (Honda, col. 8, lines 10-14):

The prepared radiation-sensitive resist mixture, can be applied to a substrate by any conventional method used in the photoresist art, including dipping, spraying, whirling, and spin coating. When spin coating, for example, the resist mixture can be adjusted as to the percentage of solids content in order to provide a coating of the desired thickness given the type of spinning equipment and spin

speed utilized and the amount of time allowed for the spinning process. (Honda, col. 8, lines 10-17. Emphasis added.)

As seen from the above excerpt, Honda merely discloses methods to apply the resist mixture to a substrate, not thinning the resist. As argued in the previous response, coating is not the same as thinning.

C) The Examiner contends that Livesay is not depended upon to disclose the percentage of the highly absorbing material but is depended upon to disclose the use of the claimed highly absorbing material such as fluoropolymer in the resist composition (Final Office Action, page 7, paragraph number 8.C). Applicant respectfully disagrees. As argued in the previous response, Livesay merely discloses a mixture of a water insoluble, acid decomposable polymer which is substantially transparent to ultraviolet or x-ray radiation, and PMMA. None of these corresponds to one of the fluoropolymer, the metallocene polymer, the alkoxide chelate polymer, and the carboxylate chelate polymer. Applicant requests the Examiner to point out the specific location of the disclosed elements.

D) The Examiner contends that Honda is relied upon to disclose the use of highly absorbing materials in the claimed percentage (i.e., from about 5% to 30%) (Final Office Action, page 7, paragraph number 8.D). Applicant respectfully disagrees for the following reasons. First, as discussed above, Honda does not disclose a highly absorbing material selected from fluorine (F), tin (Sn), bismuth (Bi), cesium (Cs), antimony (Sb), a fluoropolymer, a metallocene polymer, an alkoxide chelate polymer, and a carboxylate chelate polymer. Honda merely discloses various onium salts, halogen-containing compounds, and sulfonates (Honda, col. 5, lines 41-44). None of these corresponds to the above group. Second, Honda merely discloses the photoacid generating compound is from about 5% to 30% by weight of the solids of said radiation sensitive composition. (Honda, col. 6, lines 51-55), not a percentage in volume. As the Examiner may be aware, “weight” is not the same as “volume”.

E) The Examiner contends that Feely teaches increasing the PAG concentration in the resist composition, citing column 6, lines 15-50 (Final Office Action, page 7, paragraph 8.E). Applicant respectfully disagrees. For ease of reference, the cited excerpt is copied below.

“Some of the photoacid generators which were found to be useful
as deep UV photoacid generators were not found to be useful as x-

ray photoacid generators and two compounds, tris[2,3-dichloropropyl]phosphate and tris[2-chloroethyl]phosphate, which were not useful as deep UV photoacid generators were found to be useful as x-ray photoacid generators. When the photoacid generators were employed with the acid hardening resin system for x-ray imaging, the minimum concentration of the photoacid generator in the photosensitive composition was found to be much higher than when the same photoacid generator is used as a deep UV photoacid generator. The minimum concentration of the photoacid generator in the x-ray imagable photosensitive compositions was found to be about 10 weight percent and typically in the range of from about 10 weight percent to about 50 weight percent. Despite the need for much higher concentrations of photoacid generator in the acid hardening resin system when employing x-ray exposure rather than deep UV exposure, the resulting image resolution of the x-ray exposed negative resist was higher (more resolved) than for deep UV exposure. Because x-rays have very small wavelengths, on the order of about 0.1 to 10 nanometers, they inherently have the capability of yielding very highly resolved images. See Introduction to Microlithography, ACS Sys. Series No. 219, ACS, Washington, D.C. 1983 p. 138-140. This reference also correlates x-ray sensitivity to electron beam and proton beam sensitivity. The conclusion reached is that the basic radiation chemistry which an x-ray resist undergoes is the same for other various forms of short wavelength radiation. Accordingly, the x-ray resists of the present invention may also be useful when exposed to such other short wavelength actinic radiation.” (Feely, col. 6, lines 15-50. Emphasis added).

As seen from the above excerpt, Feely merely discloses that “[w]hen the photoacid generators were employed with the acid hardening resin system for x-ray imaging, the minimum concentration of the photoacid generator in the photosensitive composition was found to be much higher than when the same photoacid generator is used as a deep UV photoacid generator.” (Feely, col. 6, lines 21-27). Finding a minimum concentration to be much higher than when the same is used as a deep UV PAG is not the same as increasing the PAG concentration. The minimum concentration is higher as a result of using the PAG with the acid hardening resin system. This does not indicate an action of increasing the PAG concentration.

In summary, none of the Examiner's response is directed to refute Applicant's arguments. In addition, Applicant notes that the Examiner failed to address the following issues raised in the previous response:

F) Honda does not disclose improving efficiency of the PAG to capture secondary electrons, as recited in claim 1.

G) Honda does not disclose forming an etch-resistant layer below the imaging layer, as recited in claim 9.

Accordingly, the Examiner's response to Applicant's arguments is incomplete. Where a claim is refused for any reason relating to the merits thereof it should be "rejected" and the ground of rejection fully and clearly stated. See MPEP 707.07(d). Where the applicant traverses an objection, the Examiner should, if he or she repeats the rejection, take note of the applicant's argument and answer the substance of it. See MPEP 707.07(f). An omnibus rejection of the claim "on the reference and for reasons of record" is stereotyped and usually not informative and should therefore be avoided. See MPEP 707.07(d). It is important for an examiner to properly communicate the basis for a rejection so that the issues can be identified early and the applicant can be given fair opportunity to reply. See MPEP 706.02(j).

The Examiner repeated the rejection without taking note of the Applicant's arguments and without answering the substance of Applicant's arguments as presented in the response filed on December 8, 2006. The MPEP requires that the Examiner's action will be complete as to all matters. 37 CFR 1.104; MPEP 707.07. Since the Examiner's action in the Final Office Action is incomplete in that there is no answer to the substance of Applicant's arguments previously presented, the rejections have been improperly made.

Rejection Under 35 U.S.C. § 102

In the Final Office Action, the Examiner rejected claims 1-3, 7-11, 15-19, and 23-24 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,565,304 issued to Honda ("Honda"). Applicant respectfully traverses the rejection and submits that the Examiner has not met the burden of establishing a prima facie case of anticipation.

Honda discloses a chemically amplified radiation-sensitive composition used in a process for fabricating a semiconductor device. A resin including poly(hydroxystyrene) is mixed with

one or more photoacid generator, one or more dissolution inhibitor, one or more solvent, as well as optionally, speed enhancers, optionally, anti-striation agents, optionally, anti-halation agent, and optionally, plasticizers (Honda, col. 3, lines 62-64; col. 5, lines 22-32). The alkaline dissolution inhibitor is from about 5% to 30% by weight of the solids of said radiation-sensitive composition. The photoacid generating compound is preferably from about 5% to 30% by weight of the solids of said radiation sensitive composition (Honda, col. 6, lines 51-55).

Honda does not disclose, either expressly or inherently, (1) a baseline material added by a highly absorbing material selected from fluorine (F), tin (Sn), bismuth (Bi), cesium (Cs), antimony (Sb), a fluoropolymer, a metallocene polymer, an alkoxide chelate polymer, and a carboxylate chelate polymer, (2) thinning the resist to a pre-determined thickness used as an imaging layer; (3) improving efficiency of a photoactive acid generator (PAG) to capture secondary electrons produced by an ionizing radiation in the resist; and (4) forming an etch resistant layer below the imaging layer.

First, Honda merely discloses mixing the resin such as the poly(hydroxystyrene) with photacid generator, dissolution inhibitor, solvent, speed enhancers, anti-striation agents, anti-halation agent, and plasticizers (Honda, col. 5, lines 22-32). None of these components is a highly absorbing material selected from fluorine (F), tin (Sn), bismuth (Bi), cesium (Cs), antimony (Sb), a fluoropolymer, a metallocene polymer, an alkoxide chelate polymer, and a carboxylate chelate polymer.

Second, Honda merely discloses applying the resist mixture to a substrate by any conventional method used in the photoresist art, including dipping, spraying, whirling, and spin coating (Honda, col. 8, lines 10-13). None of these methods corresponds to thinning. Coating to a desired thickness is conditioned on the type of spinning equipment (Honda, col. 8, lines 15-17), and therefore is not thinning. In fact, no thinning is employed because the resulting thickness is about 1.0-2.0 μm (Honda, col. 8, lines 43-45), not less than 100 nm.

Third, Honda merely discloses mixing the resin with one or more photoacid generators (PAG) and the PAG form acid moieties under irradiation of UV light (Honda, col. 8, lines 43-45), not improving efficiency of the PAG to capture secondary electrons.

Fourth, Honda merely discloses forming a radiation-sensitive region on a device substrate (Honda, col. 3, lines 45-46) using dipping, spraying, whirling, and spin coating (Honda, col. 8,

lines 10-13). Honda specifically teaches that these resist materials are coated onto a substrate (Honda, col. 8, lines 22-23), not forming an etch-resistant layer below the imaging layer.

To anticipate a claim, the reference must teach every element of the claim. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Vergegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ 2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the...claim." Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ 2d 1913, 1920 (Fed. Cir. 1989). Since the Examiner failed to show that Honda teaches or discloses any one of the above elements, the rejection under 35 U.S.C. §102 is improper.

Therefore, Applicant believes that independent claims 1, 9, and 17 and their respective dependent claims are distinguishable over the cited prior art references. Accordingly, Applicant respectfully requests the rejection under 35 U.S.C. §102(b) be withdrawn.

Rejection Under 35 U.S.C. § 103

In the Final Office Action, the Examiner rejected claims 4, 12, and 20 under 35 U.S.C. §103(a) as being unpatentable over Honda in view of U.S. Patent No. 6,753,129 issued to Livesay et al. ("Livesay"); claims 5, 13, and 21 under 35 U.S.C. §103(a) as being unpatentable over Honda in view of U.S. Patent No. 7,049,044 issued to Gonsalves et al. ("Gonsalves"); claims 6, 14, and 22 under 35 U.S.C. §103(a) as being unpatentable over Honda in view of U.S. Patent No. 5,034,304 issued to Feely ("Feely"); and claims 25-27 under 35 U.S.C. §103(a) as being unpatentable over Honda in view of U.S. Publication No. 2003/0003393 issued to Yamaguchi et al. ("Yamaguchi").

Applicant respectfully traverses the rejection and submits that the Examiner has not met the burden of establishing a prima facie case of obviousness.

The Supreme Court in *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966), stated: "Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined." MPEP 2141. In *KSR International Co. vs. Teleflex, Inc.*, (No. 04-

1350), in a decision handed down on April 30, 2007, the Supreme Court explained that “[o]ften, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” (Slip Op. at 14. *Emphasis added.*) The Court further required that an explicit analysis for this reason must be made.

Applicant submits that the Examiner has not met the above burden and therefore a prima facie case of obviousness has not been established.

As discussed above, Honda does not disclose or suggest the elements recited in the independent claims 1, 9, and 17. Accordingly, a combination of Honda with any other references in rejecting the dependent claims is inappropriate.

Furthermore, as discussed below, the cited prior art reference(s) used to combine with Honda does(do) not provide known elements and an apparent reason to combine them in rejecting the dependent claims.

1. Claims 4, 12, and 20:

Honda discloses a chemically amplified radiation-sensitive composition used in a process for fabricating a semiconductor device as discussed above.

Livesay discloses a method and apparatus for modification of chemically amplified photoresist by electron beam exposure. A photosensitive composition includes a mixture of a water insoluble, acid decomposable polymer which is substantially transparent to ultraviolet or x-ray radiation (Livesay, col. 7, lines 60-67). Acid decomposable polymers include cyclic olefins, acrylics and methacrylates, polymethylacrylate and polymethylmethacrylate (PMMA) (Livesay, col. 8, lines 20-57).

Honda and Livesay, taken alone or in any combination, do not disclose or render obvious adding a percentage in volume at least one of the fluoropolymer, the metallocene polymer, the alkoxide chelate polymer, and the carboxylate chelate polymer, the percentage ranging from 10% to 20%.

The Examiner contends that Livesay, in col. 5, lines 55-61, in col. 7, lines 60-67, and in col. 8, lines 20-57, discloses that adding fluoro polymers in resist compositions enables the

formation of a uniform film on the substrate, and increases the surface hardness and dry etch resistance of the resist pattern (Final Office Action, page 3, paragraph number 4). Applicant respectfully disagrees and submits that the cited excerpts do not provide the recited limitation. For ease of reference, the above cited excerpts are copied below.

“at least one water insoluble, acid decomposable polymer which is substantially transparent to ultraviolet or x-ray radiation, wherein said polymer is present in the photosensitive composition in an amount sufficient to form a uniform film of the composition components when it is coated on a substrate and dried.” (Livesay, col. 5, lines 55-61)

“The first step of the process according to the invention is coating and drying a photosensitive composition onto a substrate: The photosensitive compositions useful for the invention are themselves well known in the art and are composed of a mixture of a water insoluble, acid decomposable polymer which is substantially transparent to ultraviolet or x-ray radiation at a wavelength of about 157 nm, 193 nm, 248 nm or those of x-rays; a photosensitive compound capable of generating an acid upon exposure to sufficient activating energy at a wavelength of about 157 nm, 193 nm, 248 nm or those wavelengths of x-rays, or electron beams. Microelectronic devices may be produced when the substrate is a semiconductor material.” (Livesay, col. 7, lines 60-67; col. 8, lines 1-5)

“Acid decomposable polymers suitable for a chemical amplification photoresists are well known in the art and nonexclusively include cyclic olefins, and acrylics and methacrylates such as polyalkylacrylates and polyalkylmethacrylates, norbornene containing polymers, and alicyclic polymers. The most widely employed route involves free radical copolymerization of maleic anhydride with a cyclic olefin monomer. The maleic anhydride serves as an oxygen-rich polar unit whose hydrophilic nature offsets the hydrophobic nature of the cyclic olefin monomer. Others polymers include polymethylacrylate and polymethylmethacrylate (PMMA) as well as copolymers thereof and polymers which have a backbone of polymethylmethacrylate having pendant groups which do not substantially reduce the transparency of the polymer at the wavelengths of interest. PMMA has a particularly high transmittance to the light of 193 nm wavelength and it is known for its clarity, surface hardness, UV transparency and chemical resistance. PMMA is readily commercially available from Aldrich

Chemical Company of Milwaukee, Wis. Preferably the polymer has a molecular weight in the range of from about 1,000 to about 800,000. Alicyclic polymers include acrylate/alicyclic polymers such as hybrid polymers produced by the free radical copolymerization of norbornene, maleic anhydride and either acrylic acid or t-butyl acrylate. A terpolymer of acrylonitrile, tertiary-butyl methacrylate and methacrylic acid has also been shown to have high transparency at 193 nm and excellent dry etch resistance. Siloxanes, silsesquioxane and poly{5-(2-t-butoxycarbonyloxy-2-trifluoromethyl-3,3,3-trifluoropropyl)norbornene} and hexafluoro-2-propanol polymers are useful for 157 nm sensitive compositions. Poly(4-hydroxystyrene) and poly(4-tert-butyloxy-carbonyloxystyrene) polymers are useful for 248 nm photoresist compositions.” (Livesay, col. 8, lines 20-57)

As seen from the above excerpts, Livesay merely discloses a mixture of a water insoluble, acid decomposable polymer which is substantially transparent to ultraviolet or x-ray radiation, and PMMA. None of these corresponds to one of the fluoropolymer, the metallocene polymer, the alkoxide chelate polymer, and the carboxylate chelate polymer.

Furthermore, none of the cited materials is added to the baseline material at a volume percentage ranging from 10% to 20%.

2. Claims 5, 13, and 21:

Honda is discussed above.

Gonsalves discloses nanocomposite negative resists for next generation lithographies. Methacrylate-based CA resists that incorporate inorganic clusters of polyhedral oligosilsesquioxane (POSS) into the side chains are provided (Gonsalves, col. 4, lines 26-29).

Honda and Gonsalves, taken alone or in any combination, do not disclose or render obvious thinning the resist to a thickness below 100 nm. As discussed in the 35 U.S.C. §102(b) rejection, Honda does not disclose or suggest thinning. Furthermore, Honda specifically teaches that the thickness is about 1.0-2.0 μm (Honda, col. 8, lines 43-45), which is 10 to 20 times more than the thickness of 100nm. Accordingly, Honda teaches away from the claimed invention because the thickness is different by an order of magnitude. Therefore, a combination of Honda with Gonsalves is improper.

Furthermore, Gonsalves merely discloses a methacrylate-based CA resists that incorporate inorganic clusters (Gonsalves, col. 4, lines 26-29), not a resist having a baseline

material added by a highly absorbing material selected from fluorine (F), tin (Sn), bismuth (Bi), cesium (Cs), antimony (Sb), a fluoropolymer, a metallocene polymer, an alkoxide chelate polymer, and a carboxylate chelate polymer.

3. Claims 6, 14, and 22:

Honda is discussed above.

Feely discloses a photosensitive compounds and thermally stable and aqueous developable negative images. A number of halogenated organic materials are suitable for use as photoacid generators to produce aqueously developable images on deep UV exposure (Feely, col. 5, lines 30-35). Submicron images on the order of about 0.2 to 1 micron are capable of being produced with the photosensitive composition using an X-ray source (Feely, col. 6, lines 51-53).

Honda and Feely, taken alone or in any combination, do not disclose or render obvious increasing a PAG concentration in the resist. Feely merely discloses that when the photoacid generators are employed with the X-ray imaging, the minimum concentration was found to be much higher than when the same photoacid generator is used as a deep UV photoacid generator (Feely, col. 6, lines 21-28). The photoacid generators are used in combination of the acid hardening resins without any improved efficiency. Furthermore, Feely does not disclose capturing secondary electrons. Feely merely made an observation that the minimum concentration of the PAG is higher when used with X-ray than with deep UV, not to increase the PAG concentration to improve efficiency.

4. Claims 25-27:

Honda is discussed above.

Yamaguchi discloses a photoresist, photolithography method using the same, and method for producing photoresist. The amount of the photosensitive component is so adjusted that the absorption coefficient α (μm^{-1}) of the photoresist for the exposure light satisfies the relation $0.5 \leq \alpha \leq 7$, or more preferably $1 \leq \alpha \leq 5$ (Yamaguchi, paragraphs [0068] – [0069]). The value of 7 corresponds to the 50% transmittance in the case of the 100 nm film thickness of the applied photoresist (Yamaguchi, paragraph [0071]).

Honda and Yamaguchi, taken alone or in any combination, do not disclose or render obvious the thickness is balanced with dosage of radiation exposure to have an overall

transmission of approximately 50%. As discussed above in the 35 U.S.C. §102(b) rejection, does not disclose or render obvious thinning the resist to a pre-determined thickness.

Accordingly, a combination of Honda with any other references in rejecting claims 25-27, which depend on claim 1, 9, and 17, respectively, is improper.

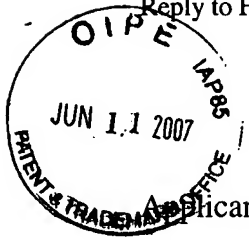
Furthermore, Yamaguchi merely discloses adjusting the amount of the photosensitive component so that the absorption coefficient α is less than or equal to 7 which corresponds to a 50% transmittance (Yamaguchi, paragraphs [0068] – [0069], and [0071]), not balancing the thickness with dosage of radiation exposure to have an overall transmission of approximately 50%. First, Yamaguchi merely discloses a fixed thickness of 100 nm, not balancing the thickness. Second, Yamaguchi merely discloses a blue semiconductor laser as an exposure light source within the range of 200 nm and 500 nm (Yamaguchi, paragraph [0011]), not balancing with dosage of radiation exposure. Third, Yamaguchi specifically discloses that the thickness is set about the minimum aperture used in the exposure to provide a sufficient tolerance to dry etching (Yamaguchi, paragraph [0085]), not to have an overall transmission of approximately 50%.

In summary, The Examiner failed to establish the factual inquires in the three-pronged test as required by the *Graham* factual inquires. There are significant differences between Honda, Livesay, Gonsalves, Feely, and Yamaguchi and the claimed invention as discussed above. Furthermore, the Examiner has not made an explicit analysis on the apparent reason to combine the known elements in the fashion in the claimed invention, as required by the Supreme Court in *KSR International Co. vs. Teleflex, Inc.* None of the cited references disclose known elements. Among other things, Honda merely discloses various onium salts, halogen-containing compounds, and sulfonates, not a highly absorbing material selected from fluorine (F), tin (Sn), bismuth (Bi), cesium (Cs), antimony (Sb), a fluoropolymer, a metallocene polymer, an alkoxide chelate polymer, and a carboxylate chelate polymer; Honda merely discloses applying the resist mixture to a substrate by any conventional method used in the photoresist art, including dipping, spraying, whirling, and spin coating; not thinning the resist; Honda merely discloses 5% to 30% by weight, not 10% to 20% by volume; Livesay merely discloses a mixture of a water insoluble, acid decomposable polymer which is substantially transparent to ultraviolet or x-ray radiation, and PMMA, not one of the fluoropolymer, the metallocene polymer, the alkoxide chelate

polymer, and the carboxylate chelate polymer; Gonsalves merely discloses a methacrylate-based CA resists that incorporate inorganic clusters, not a resist having a baseline material added by a highly absorbing material selected from fluorine (F), tin (Sn), bismuth (Bi), cesium (Cs), antimony (Sb), a fluoropolymer, a metallocene polymer, an alkoxide chelate polymer, and a carboxylate chelate polymer; Feely merely discloses that when the photoacid generators are employed with the X-ray imaging, the minimum concentration was found to be much higher than when the same photoacid generator is used as a deep UV photoacid generator, not increasing the PAG concentration or capturing secondary electrons; Yamaguchi merely discloses a fixed thickness of 100 nm, not balancing the thickness; and Yamaguchi merely discloses a blue semiconductor laser as an exposure light source within the range of 200 nm and 500 nm, not balancing with a dosage of radiation exposure; Yamaguchi specifically discloses that the thickness is set about the minimum aperture used in the exposure to provide a sufficient tolerance to dry etching, not to have an overall transmission of approximately 50%. Accordingly, there is no apparent reason to combine the teachings of Honda and the teachings of any one of Livesay, Gonsalves, Feely, and Yamaguchi

In the present invention, the cited references do not expressly or implicitly suggest any of the recited limitations. In addition, the Examiner failed to present a convincing line of reasoning as to why a combination of Honda, Livesay, Gonsalves, Feely, and Yamaguchi is an obvious application of absorptive resists.

Therefore, Applicant believes that independent claims 1, 9, and 17 and their respective dependent claims are distinguishable over the cited prior art references. Accordingly, Applicant respectfully requests the rejections under 35 U.S.C. §103(a) be withdrawn.



Conclusion

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Dated: June 7, 2007

By

Eric T. King

Reg. No. 44,188

Tel.: (714) 557-3800 (Pacific Coast)

12400 Wilshire Boulevard, Seventh Floor
Los Angeles, California 90025

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